

WHITE CELL COUNTS IN HUMAN SEMEN

THEIR USE IN THE DIAGNOSIS OF PROSTATITIS WITH REFERENCE TO UVEITIS*

BY

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Chronic non-specific prostatitis was described as occurring in ankylosing spondylitis by Romanus (1953). Since then it has been described in rheumatoid arthritis (Mason, Murray, Oates, and Young, 1958; Csonka, 1959), Reiter's arthritis, and such rheumatic complications as uveitis (Catterall, 1958). The common association of prostatitis with non-specific urethritis has led to the use of the term "non-specific uro-genital infection". In some of these patients prostatic involvement is said to be "chronic from the first" (King and Nicol, 1964).

In the studies mentioned, as well as others, the diagnosis of prostatitis has been made in terms of white cell or polymorph estimations of prostatic fluid. The limitations of the method are many. There have, for instance, been several suggestions as to the upper limit of normality, although most workers now accept more than ten white cells per 1/12 field as diagnostic of prostatitis (Oates, 1958; Ambrose and Taylor, 1953). Even with this criterion, however, as much as a third of control specimens are found at the pathological level. Furthermore, repeat testing gives variable results. Clumping of white cells has been invoked to support the diagnosis. Catterall (1958) accepts ten or more white cells *or* clumping; Csonka (1959) accepts ten or more cells *with* clumping; Grainger and Nicol (1959) insist on clumping always being present. Oates (1958), after detailed studies, pointed out the limitations of the criteria due to urethral contamination, varying techniques, and the pertinent fact that many microscope fields, even in multiple specimens, may be completely free from white cells. He concludes that the method offers only "a rough estimate".

Other limitations may well exist. Transudation, rather than exudation, of white cells, caused by

early morning peri-prostatic congestion or by the patients' being bedfast, may be relevant. The lack of response to treatment also seems pertinent. It is little wonder then that Gartman (1958) considered interpretation of prostatic bead examinations to be "meaningless".

With a view to a more scientific approach, Huggins and McDonald (1944) and Oates (1958) used counting chambers for prostatic white cell counts. The lack of standard normal levels, the tendency of white cells to clump, staining difficulties, and the time necessary were found to limit the usefulness of this method.

With a view to overcoming some of these difficulties, white cell counts of total semen ejaculates have been undertaken.

Material

104 ambulant men, aged 19 to 61 years and all U.K.-born, submitted specimens of semen, 32 of them on more than one occasion. All were seen personally, and they were classified into two main groups:

- (1) *69 Subfertile Men* 25 were normal in regard to genito-urinary anatomy. All had a normal semen as judged by volume, sperm density, basic motility, viability, and morphology.
14 had some degree of semen abnormality.
16 were sterile.
14 formed a miscellaneous sub-group, of which six had varicocele and eight a past history of genito-urinary infection or disease, *e.g.* epididymitis, prostatic abscess, hydrocele, mumps.
- (2) *35 Men with Uveitis* These were cases referred by ophthalmological colleagues. None had any evidence of genito-urinary infection or anatomical abnormality.

Method

With a view to standardization of testing, semen specimens were submitted after 3 to 5 days' sexual abstinence. Samples were collected after masturbation or coitus interruptus in 3" semen jars of 1" diameter.

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All specimens were examined within 2 hours of production. To facilitate sperm and white cell counts, dilution with physiological saline was used where necessary and immobilization of sperms was effected by formalin vapour. Detailed semen analysis was confined to the *subfertility group of 69*.

White cell counts were determined on all specimens using a Thoma-Zeiss counting chamber. Where two or more separate semen samples were submitted by the same patient the average count has been reported. All counts are expressed as the numbers of white cells in millions per ml.

Results

The Table shows little difference in the findings as between strict normal controls and the men with abnormal or sterile semen. Two of those with abnormal semen had high white cell counts, one of 10 and the other 20 million per ml. Repeat testing of further samples gave counts in the lowest range. In the one sterile man giving a high count the test was not repeated. The numbers involved are small but statistically permit the suggestion that some men with abnormal or sterile semen may be included with any control group.

Two small groups gave findings quite distinct from those of the strict controls. Of the high levels found in men with varicocele, counts ranged from 8 to 35 million per ml. The highest counts in the whole series of 104 were given by men with a past history of genito-urinary infection. Of the five with counts of more than 5 million white cells per ml. four had three separate specimens examined, and all gave high counts. The one low count in the group was produced by a man with a past history of mumps orchitis. Statistical analysis makes it quite clear that men with varicocele or a history of epididymitis, prostatic abscess, or hydrocele should be excluded from any control group ($P < 0.001$).

Compared with strict controls, high white cell counts in the semen of men with uveitis are more common than not ($P < 0.02$). This finding stands

up to comparison even with the whole of the subfertility group of 69.

Discussion

This short report can be seen only as a preliminary study. One of the surprising findings in the literature is the near absence of reports on the normal range of white cell counts in semen. Only one has been found: Svendsen (1948) in Norway found a range of 0.1 to 1 million per ml. (mean 332,500) in 53 normal samples. Clare Harvey, who has had long experience of human semen analysis at the Department of Zoology, Exeter University, gives, in a personal communication, 200,000 white cells per ml. as "probably near the mark" for normal semen. She cautions against confusing multi-nucleated spermatocytes with white cells. With only these two reports available it was therefore thought necessary in this study to try to establish the upper limit of normal and this has been given as 2 million white cells per ml. semen. Counts of 3 to 5 million are in a doubtful range; counts above 5 million are believed to reflect pathological change.

White cell counts of semen have some advantages over estimations in prostatic fluid for the purpose of diagnosis. Whereas total semen volumes may show slight differences between repeat specimens from the same man, it is generally recognized that the volume of the prostatic component varies little even in men producing repeated samples at short intervals (Harvey (1956), Eliasson (1965)). Following liquefaction, semen samples rarely showed clumping of white cells. The subsequent even distribution of cells therefore facilitated more accurate counting. All these factors, together with the use of a counting chamber make for a more meaningful approach to the diagnosis of prostatitis.

Catterall (1958) found 58 (78.4 per cent.) of 74 men with uveitis to have prostatitis. He used

TABLE
WHITE CELL COUNTS IN HUMAN SEMEN IN 104 CASES

White Cells (millions per ml.)	Group I (Subfertile)						Group II
	Normal Controls	Abnormal Semen	Sterile Semen	Miscellaneous		Total	Uveitis
				Varicocele	Past Genito- urinary Infection		
2 or Less	16	12	13	—	1	42	11
3-5	9	0	2	2	2	15	4
More than 5	0	2	1	4	5	12	20
Total	25	14	16	6	8	69	35

the prostatic bead method. In this series, if 2 million white cells per ml. of semen is taken as the upper limit of normal, 24 (70 per cent.) of 35 men with uveitis show prostatitis. None of the uveitis group had evidence of existing genito-urinary infection or anatomical abnormality. None, however, had a full semen analysis. The possible importance of this came to light only on completion of the study and analysis of the data. Clearly this aspect must receive attention in further studies.

Attempts to diagnose prostatitis by biochemical analysis of prostatic fluid obtained by fractionation of semen have not yet met with universally acceptable methods, standards, or criteria. Attempts seem to be bedevilled by an inability to define prostatitis in clinical or scientific terms. It would appear that, as in neuro-syphilis, a correlated, three-point approach—cell counts, biochemical analysis, and study of biopsy material—will be essential to the thorough establishment of prostatitis as a clinical entity. In such a study semen white cell counts offer advantages over prostatic bead estimations.

Summary and Conclusions

An attempt has been made to define the range and upper limit of normality of white cell counts in human semen.

Groups which should be excluded from any normal control series have been identified.

When the findings in normal controls are compared with those in men with uveitis, the latter group shows 70 per cent. in the abnormal range.

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Le nombre des globules blancs dans le sperme humain

Leur utilité dans le diagnostic de la prostatite se référant à l'uvéite

RÉSUMÉ

Une tentative a été faite afin de déterminer la variation et la limite supérieure de la normalité du nombre de globules blancs dans le sperme humain.

Des groupes qui devraient être exclus de n'importe quelle série normale ont été identifiés.

Quand les constatations chez les contrôles normaux sont comparées à celles des hommes atteints de l'uvéite, ces hommes montraient que 70 pour cent d'entre eux étaient en dehors de la normale.